

4. (Twice Amended) The method as set forth in [any of the] claim 1, wherein said workpiece (12) having a round surface (14) is worked by at least one roll (16, 16', 16'') provided at least in part with an outer profile (22, 22') arranged parallel to said workpiece (12) and which is rotatable about the longitudinal centerline (18, 18', 18'') thereof as well as about said workpiece (12).

X 5. (Twice Amended) The method as set forth in claim 1, wherein said workpiece (12'') including at least one bore (14'') [or similar opening] is worked by at least one roll (16, 16', 16'', 74', 74'', 86', 86'') provided at least in part with an outer profile (22, 22') arranged parallel to said bore (14'') [or similar opening] and which is rotatable about said longitudinal centerline (18, 18'') as well as about said bore (14'') [or similar opening].

6. (Twice Amended) The method as set forth in claim 4, wherein said workpiece (12, 12'') is worked by a roll (16, 16', 16'') provided at least in part with an outer profile (22, 22') and at least [one, or] two, substantially non-profiled roll(s) (16'') arranged about said workpiece (12) or in said [at least one] bore (14'') [or similar opening].

B 7. (Previously Amended) The method as set forth in claim 6, wherein said workpiece (12, 12'') is worked by a roll (16'') having an outer profile (22, 22') in the form of annular beads (24) and recesses arranged at an angle (α , α') to said longitudinal centerline (18, 18', 18'') of said roll (16, 16', 16'', 74', 74'', 86', 86''), whereby said annular beads (24) and recesses (26) arranged at an angle (α , α') to said longitudinal centerline (18'') of said roll (16'') comprise a lead position substantially opposing each other.

8. (Twice Amended) The method as set forth in claim 4, wherein said workpiece (12, 12'') is worked by two rolls (16, 16') each provided at least in part with an outer profile (22, 22') and a substantially non-profiled roll (16'') arranged about said workpiece (12) or in said [at least one] bore (14'') [or similar opening].

9. (Previously Amended) The method as set forth in claim 8, wherein said workpiece (12, 12'') is worked by two rolls (16, 16') having an outer profile (22, 22'') in the form of annular beads (24) and recesses (26) arranged at an angle (α , α') to said longitudinal centerlines (18, 18') of said rolls (16, 16').

10. (Twice Amended) The method as set forth in claim 9, wherein said two rolls (16, 16') are powered in [a] the same direction of rotation when said annular beads (24) and recesses (26) arranged at an angle (α , α') to said longitudinal centerlines (18, 18') of said two rolls (16, 16') comprise a lead position substantially opposing each other.

11. (Twice Amended) The method as set forth in claim 9, wherein said two rolls (16, 16') are powered in [an] the opposite direction of rotation when said annular beads (24) and recesses (26) arranged at an angle (α , α') to said longitudinal centerlines (18, 18') of said two rolls (16, 16') comprise a lead position substantially the same to each other.

12. (Previously Amended) The method as set forth in claim 1, wherein said workpiece (12') including at least one flat surface (14') is worked by at least one roll (74', 74'', 86', 86'') provided at least in part with an outer profile (76, 76', 78, 78') arranged substantially perpendicular or at an angle β to said workpiece (12') and rotatable about the longitudinal centerline (80) thereof.

13. (Previously Amended) The method as set forth in claim 12, wherein said workpiece (12') is worked by at least one roll (74', 74'') provided at least in part with an outer profile (76, 76', 78, 78') and is worked or supported by at least one further roll (86', 86'') provided at least in part with an outer profile (76, 76', 78, 78') or a non-profiled roll (86, 86'') or similar supporting means located spaced away and opposite said at least one roll (74', 74'').

14. (Previously Amended) The method as set forth in claim 13, wherein said surface (14') to be treated of said workpiece (12') is worked by said at least one roll (74', 74'', 86', 86'') including an outer profile (76, 76', 78, 78') in the form of annular beads (24) and recesses (26).

15. (Previously Amended) The method as set forth in claim 14, wherein said surface (14') of said workpiece (12') to be treated is worked by several rolls (74', 74'', 86', 86'') having an outer profile (76, 76', 78, 78') in the form of annular beads (94) and recesses (96), whereby said annular beads (94) and recesses (96) of adjoining rolls (74', 74'', 86', 86'') differ from each other in their configuration and arrangement and/or each of said adjoining rolls (74', 74'', 86', 86'') is powered in a different direction of rotation.

16. (Twice Amended) The method as set forth in claim 15, wherein said surface (14') of said workpiece (12') to be treated is worked by rolls (74'', 86'') having an outer profile (78, 78') in [a] the form of annular beads (24) and recesses (26) arranged at an angle (α , α') to said longitudinal centerlines (80) of said rolls (74'', 86''), whereby said rolls (74'', 86'') are powered in [a] the same direction of rotation for a substantially opposite lead position of said beads (24) and recesses (26) or in [an] the opposite direction of rotation for a substantially same lead position of said beads (24) and recesses (26).

17. (Twice Amended) The method as set forth in claim 15, wherein said surface (14') of said workpiece (12') to be treated is worked by rolls (74', 86') having an outer profile (76, 76') in [a] the form of annular beads (94) and recesses (96) arranged perpendicular to their longitudinal centerlines (80), [more particularly] said rolls being axially staggered relative[ly] to each other.

18. (Twice Amended) The method as set forth in claim 1, wherein said workpiece (12, 12', 12'') or said surface (14, 14') or said [at least one] bore [(14'')] or similar opening to be treated of said workpiece (12, 12', 12'') is coated with a covering of metal, [such as chromium, copper or the like, and/or with] a metal alloy [and/or], a paint [and/or], plastics [and/or], is anodized [and/or], galvanized [and/]or pickled.

19. (Twice Amended) A device for surface treatment of workpieces (12) of aluminum and/or alloyed aluminum having a round surface (14), which is worked at least in part by at least one roll (16, 16', 16'')[, 74', 74'', 86', 86'')] provided at least in part with an outer profile (22, 22'[, 76, 76', 78, 78'']) having the form of annular beads and recesses at an angle α or α' to the longitudinal centerline of the roll by exposing the treated surface (14[, 14', 14'']) of said workpiece (12[, 12', 12'']) to [inherent] compressive stresses; and exposing zones located beneath said treated surface (14[, 14', 14'']) of said workpiece (12[, 12', 12'']) to [inherent] tensile[s] stresses axially and tangentially, comprising:

three rolls (16, 16', 16'', 16''') arranged parallel to and about said workpiece (12) provided at least in part with an outer profile (22, 22') configured in the form of annular beads (24) and recesses (26) arranged at an angle (α , α') to said longitudinal centerline (18, 18', 18''') of said roll (16, 16', 16''') working said surface (14) of said workpiece (12) and each rotatable about their longitudinal centerlines (18, 18', 18'', 18''') as well as in combination about said workpiece (12).)

20. (Twice Amended) The device for surface treatment of workpieces (12'') of aluminum and/or alloyed aluminum having at least one bore (14'') [or similar opening], which is worked at least in part by at least one roll (16, 16', 16'', 16''')[, 74', 74'', 86', 86'']) provided at least in part with an outer profile (22, 22'[, 76, 76', 78, 78'']) having the form of annular beads and recesses at an angle α or α' to the longitudinal centerline of the roll by exposing the treated surface (14, 14', 14'') of said workpiece ([12, 12', 12'']) to [inherent] compressive stresses; and exposing zones located beneath said treated surface ([14, 14', 14'']) of said workpiece ([12, 12', 12'']) to [inherent] tensile[s] stresses axially and tangentially, comprising:

at least two[, more particularly three] rolls (16, 16', 16'', 16''') provided at least in part with an outer profile (22, 22') configured in the form of annular beads (24) and recesses (26) arranged at an angle (α , α') to said longitudinal centerline (18, 18', 18''') of said roll (16, 16', 16''') working said surface (14) of said workpiece (12'') and each rotatable about their longitudinal centerlines (18, 18', 18'', 18''') as well as in combination about said workpiece (12'') working said bore (14'') [or similar

opening] and each rotatable individually about their longitudinal centerlines (18, 18', 18", 18''') as well as in combination in said bore (14'') [or similar opening].

21. (Cancelled)

22. (Twice Amended) The device as set forth in claim [21] 20, wherein [the remaining rolls, more particularly] one roll (16'')[, are/]is configured non-profiled.

23. (Twice Amended) The device as set forth in claim [19] 20, wherein said at least [one, or] two roll[(s)] (16, 16', 16''') are provided at least in part with an outer profile (22, 22') working said workpiece (12, 12'') in sequence in [the] opposite directions.

24. (Previously Amended) The device as set forth in claim 23, wherein said one roll (16''') is provided with an outer profile (22, 22') in the form of annular beads (24) and recesses arranged at an angle (α , α') to said longitudinal centerline (18''') of said roll (16''') in a lead position substantially opposing each other.

25. (Twice Amended) The device as set forth in claim 23, wherein two adjoining rolls (16, 16') having an outer profile (22, 22') are drivable in [a] the same direction of rotation for substantially an opposed lead position of said beads (24) and recesses (26) and in [an] the opposite direction of rotation for substantially [a] the same lead position of said beads (24) and recesses (26).

26. (Previously Amended) The device as set forth in claim [19] 20, wherein said at least one roll (16, 16', 16''') is provided with non-profiled ends (30, 32).

27. (Previously Amended) The device as set forth in claim 26, wherein said non-profiled end (30) of said at least one roll (16, 16', 16''') incoming in said direction of movement of said workpiece (12, 12'') comprises a slightly smaller outer diameter.

28. (Twice Amended) The device as set forth in claim 26 [or 27], wherein said non-profiled end (32) of said at least one roll (16, 16', 16''') outgoing in said direction of movement of said workpiece (12, 12'') has a slightly larger outer diameter.

29. (Twice Amended) The device as set forth in claim 19, wherein said rolls (16, 16', 16'', 16''') are mounted by a drive means (34) for rotating each of said rolls (16, 16', 16'', 16''') individually about their longitudinal centerlines (18, 18', 18'', 18''') and by a drive head [(36) or similar drive

arrangement] for rotating said rolls (16, 16', 16", 16''') in combination about said workpiece (12) or in said at least one bore (14'') [or the like] of said workpiece (12'').

30. (Twice Amended) The device as set forth in claim 29, wherein each of said rolls (16, 16', 16", 16''') is non-rotatably mounted by said drive means (34) by one end (30), [more particularly] via a section (38) and a correspondingly shaped recess (40) of said drive means (34), and is rotatably mounted by said drive head (36) or similar drive arrangement by one end (32).

31. (Previously Amended) The device as set forth in claim 29, wherein said drive means (34) and/or said drive head (36) is/are controllable hydraulically or pneumatically.

32. (Previously Amended) The device as set forth in claim 29, wherein said drive means (34) comprises drive motors (46) each assigned to one of said rolls (16, 16', 16'').

33. (Previously Amended) The device as set forth in claim 29, wherein said drive head (36) or similar drive arrangement is rotatable with a worm drive (48) powered more particularly via a separate drive motor (50).

34. (Previously Amended) The device as set forth in claim 29, wherein said drive means (34) and said drive head (36) are configured movable relative to each other.

35. (Twice Amended) The device as set forth in claim 34, wherein said drive means (34) is longitudinally shiftable via a guide means (52) [or the like] and a mechanically, electrically, hydraulically or pneumatically actuatable drive element (54)[, more particularly a pressure cylinder or the like].

36. (Previously Amended) The device as set forth in claim 29, wherein said drive means (34) and/or said drive head (36) is/are provided with a centering means (58) for said workpiece (12).

37. (Twice Amended) A device for surface treatment of workpieces (12['']) of aluminum and/or alloyed aluminum having at least one flat surface (14'), which is worked at least in part by at least one roll ([16, 16', 16'', 16'''], 74', 74'', 86', 86'') provided at least in part with an outer profile ([22, 22', 22'', 22'''], 76, 76', 78, 78'') having the form of annular beads and recesses by exposing the treated surface ([14, 14', 14'', 14''']) of said workpiece ([12, 12', 12'', 12''']) to [inherent] compressive stresses; and exposing zones located beneath said treated surface ([14, 14', 14'', 14''']) of said workpiece ([12, 12', 12'', 12''']) to [inherent] tensile[s] stresses axially and tangentially, comprising:

at least one roll (74', 74'', 86', 86'') arranged substantially perpendicular or at an angle β to the longitudinal direction (arrow 28) of said workpiece (12') which is provided with an outer profile (76, 76', 78, 78') configured in [a] the form of annular beads (94) and recesses (96) of said at least one roll (74'') arranged at an angle (α , α') to the longitudinal centerline (80) thereof or annular beads (94) and recesses (96) arranged perpendicular working said surface (14') of said workpiece (12') at least in part and which is rotatable about the longitudinal centerline (80) thereof.

38. (Twice Amended) The device as set forth in claim 37, wherein said at least one roll (74', 74'') provided with an outer profile (76, 76', 78, 78') at least in part is assigned at least one further roll (86', 86'') provided at least in part with an outer profile (76, 76', 78, 78') or non-profiled roll (86', 86'') [or like] supporting means opposite.

39. (Twice Amended) The device as set forth in claim 37, wherein said at least one roll (74', 74'', 86', 86'') provided with an outer profile (76, 78) at least in part is followed by an additional roll (74', 74'', 86', 86'') provided likewise at least in part with an outer profile (76', 78') to work said surface (14') of said workpiece (12') in sequence in [an] the opposite direction.

40. (Twice Amended) The device as set forth in claim 39, wherein said two rolls (74'', 86'') following each other comprise annular beads (94) and recesses (96) arranged at an angle (α , α') to the longitudinal centerlines (80) thereof, said two rolls (74'', 86'') being powered in the same direction of rotation when said annular beads (94) and recesses (96) comprise a lead position substantially opposing or in [an] the opposite direction of rotation when said annular beads (94) and recesses (96) comprise a lead position substantially the same.

41. (Twice Amended) The device as set forth in claim 39, wherein said two rolls (74', 86') following each other comprise annular beads (94) and recesses (96) arranged perpendicular to the longitudinal centerlines (80) thereof, said two rolls (74', 86') and/or said annular beads (94) and recesses (96) being axially staggered relative to each other.

42. (Previously Amended) The device as set forth in claim 37, wherein at least one non-profiled roll (74, 74'', 86', 86'') is provided upstream and/or downstream of said at least one roll (74', 74'', 86', 86'') provided at least in part with an outer profile (76, 76', 78, 78') working said surface (14') of said workpiece (12') in the direction of movement of said workpiece (12').

43. (Previously Amended) The device as set forth in claim 42, wherein said at least one upstream non-profiled roll (74', 74'', 86', 86'') comprises a slightly smaller outer diameter.

44. (Previously Amended) The device as set forth in claim 42, wherein said at least one non-profiled downstream roll (74', 74"', 86', 86'") comprises a slightly larger outer diameter.

45. (Previously Amended) The device as set forth in claim 37, wherein said annular beads (24, 94) protrude beyond the outer diameter of said at least one roll (16, 16', 74', 74"', 86', 86'").

46. (Previously Amended) The device as set forth in claim 37, wherein said at least one roll (74', 74'") is mounted in a mounting means (72) movable relative to supporting means (84) supporting said workpiece (12').

47. (Previously Amended) The device as set forth in claim 46, wherein said mounting means (72) is adjustable relative to said supporting means (84) via a guide means (88) and a mechanically, electrically, hydraulically or pneumatically actuatable drive element (90), or a pressure cylinder.

48. (Previously Amended) The device as set forth in claim 46, wherein said supporting means (84) comprises said at least one further roll (86', 86'") provided at least in part with an outer profile (78, 78') or said non-profiled roll (86, 86'").

49. (Previously Amended) The device as set forth in claim 46, wherein said mounting means (72) and/or said supporting means (84) is/are expediently hydraulically or pneumatically controllable.

50. (Previously Amended) The device as set forth in claim 46, wherein said at least one further roll (74', 74"', 86', 86'") provided with an outer profile (76, 76', 78, 78') at least in part and/or non-profiled is assigned in each case a separate drive motor (92).

51. (Previously Amended) The device as set forth in claim 37, wherein said rolls (16, 16', 16"', 74', 74', 74"', 86, 86', 86'") are configured multi-part, being composed of a roll (60) as well as a sleeve (64) non-rotatively connected to said shaft (6) together with said outer profile (22, 22', 76, 76', 78, 78') provided at least in part, said smooth incoming end (30) and said smooth outgoing end (32) or with a smooth surface throughout.

52. (Previously Amended) The device as set forth in claim 37, wherein said rolls (16, 16', 16"', 74, 74', 74"', 86, 86', 86', 86'") are coolable by an internal cooling system and/or an external cooling bath.

53. (Twice Amended) A method as set forth in claim 1, for surface treatment of workpieces (12, 12', 12'') [of metal, more particularly] of base metals such as aluminum, lead, chromium, iron,

cobalt, nickel, copper, manganese, molybdenum, silicon, tungsten, tin, zinc or alloys thereof including brass, [preferably of] steel and/or aluminum and/or alloyed aluminum [such as] including AlMg4.5Mn, AlMgSi0.5, AlMgSi, AlMg5, AlZn4.5Mg, AlCuMg, AlCuMg2, AlZnMgCu0.5, AlZnMgCu1.5, AlCuMgPb or of noble metals including gold, palladium, platinum, silver or alloys thereof, or of combinations of base and noble metals.

54. (Twice Amended) The method as set forth in claim 1, for producing elongated sections (12, 12') of solid metal, [especially where hardened and/or coated, more particularly] selected from wires, rods and strip and/or tubular material[, more particularly tubing, preferably] for headrest brackets in automobiles.

55. (Twice Amended) The method as set forth in claim 1, for producing coiled, or hardened and/or coated workpieces [preferably] for coiled springs.

56. (Twice Amended) The method as set forth in claim 1, for producing bores (14") [or similar openings,] or through-holes and/or blind holes in automotive engines.

57. (Twice Amended) The method as set forth in claim 1, for producing elongated sections ([12,]12') of solid metal[, especially where hardened and/or coated,] including at least one flat surface (14") [more particularly rods and strip and/or tubular material, more particularly tubing, preferably] for headrest brackets in automobiles.

58. (Twice Amended) The method as set forth in claim 1, wherein said metal, includes base metals [comprising] selected from aluminum, lead, chromium, iron, cobalt, nickel, copper, manganese, molybdenum, silicon, tungsten, tin, zinc or alloys thereof including brass, steel and/or aluminum and/or alloyed aluminum [comprising,] selected from AlMg4.5Mn, AlMgSi0.5, AlMgSi, AlMg5, AlZn4.5Mg, AlCuMg, AlCuMg2, AlZnMgCu0.5, AlZnMgCu1.5, AlCuMgPb or of noble metals [including] selected from gold, palladium, platinum, silver or alloys thereof, or of combinations of base and noble metals.

59. (Twice Amended) The device as set forth in claim 19 20, wherein elongated sections (12,[12']) of solid metal are produced, [especially where hardened and/or coated, including] selected from wires, rods and strip and/or tubular material, [including tubing, and] for headrest brackets in automobiles.

60. (Twice Amended) The device as set forth in claim 19, wherein coiled workpieces (12) are produced, [including hardened and/or coated workpieces preferably] for coiled springs.

*Drawings in memory
to make a drawing
of a spring - Coiled (Spring)
any
will know*